

The origin of submarine groundwater discharge in the coastal zone of Hiji, Oita prefecture

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It is said that groundwater discharge from the seabed of the coastal zone of Hiji, Oita prefecture. The marbled sole which lives around this submarine groundwater discharge is called a “Shirosita Karei”, and is loved by the local people. From ancient times, the local people have believed that this Shirosita Karei grows because of submarine groundwater discharge. However, regarding the relevance of the ecology of a marbled sole and submarine groundwater discharge, it is not clear that this is the case. Moreover, although it is clear that there is submarine groundwater discharge, there is almost no information about the origin and dissolved component. Kono and Tagawa (1996) conducted an analysis of the major dissolved components of groundwater of this land area, and a vertical distribution investigation of the electric conductivity of the ocean. As a result, it has suggested the possibility that submarine groundwater discharge is the confined groundwater recharged in the mountain area. However, in that report, they said that they were not able to identify a recharge area clearly by this research. Because of that, we sampled the spring water of the land area, the spring water of a salt water mixture discharged in a seashore area, and a sea water sample, in order to conduct hydrological research using the stable isotope of water in this area and to clarify the flow process of submarine groundwater discharge. The recharge elevation of the spring water of this land area was assumed using the recharge-water line (Ohsawa et al., 2009) made using the data of the Beppu area of the southwest part of this research region. As a result, it became clear that the recharge area of most spring water is at an elevation of 200 m or more. Regarding fresh water and salt water mixture, the mixed rate of sea water and fresh water was calculated using electric conductivity, and the isotopic ratio of the original fresh water was computed using the mixed rate. As a result, it became clear that the recharge elevation of the fresh water mixed in sea water is near 300 m. Moreover, as a result of extracting the terrestrial environment of this area, the area with an elevation of 200 m or more is mainly forest, and there was a boundary between the forest area and plains near an elevation of 200 m. It became clear from these results that the origin of the submarine groundwater discharge in the coastal zone of Hiji is the water recharged in the forest area of the mountain slope, and that the water moves under the plain and is discharged at the sea bed.

Keywords: Submarine groundwater discharge, Stable isotope, recharge area, Hiji